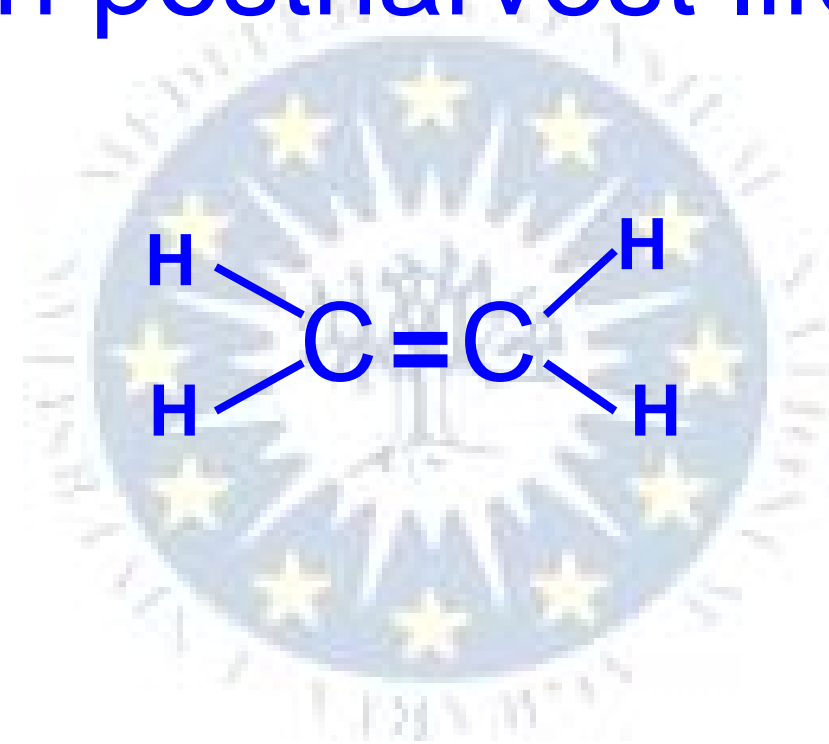


The role of ethylene in postharvest life



E. Sfakiotakis

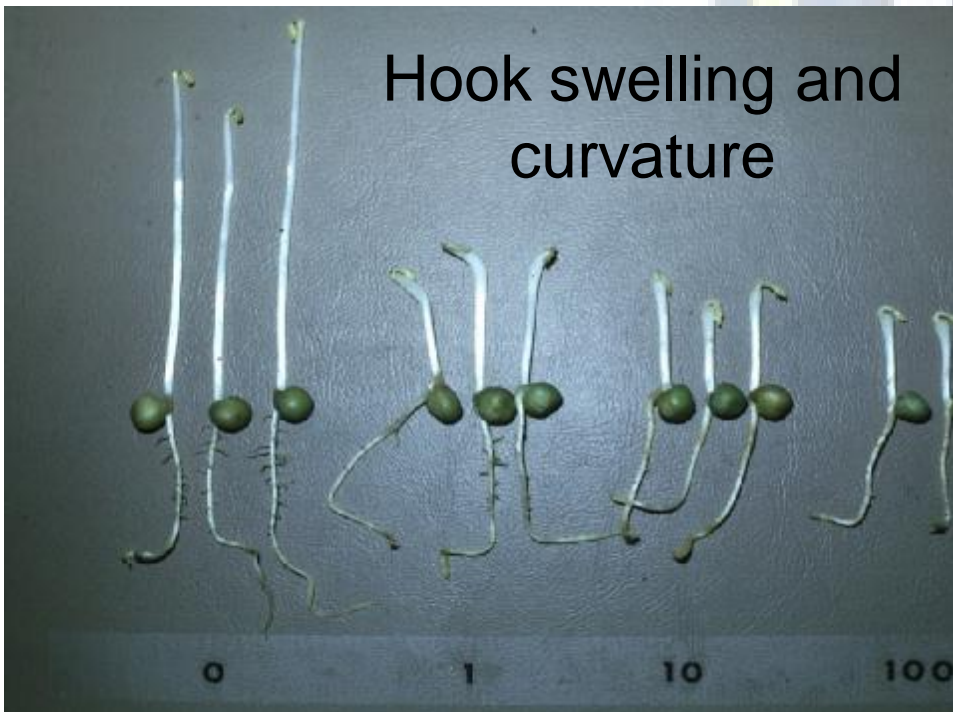
Fruit ripening



Ethylene effects



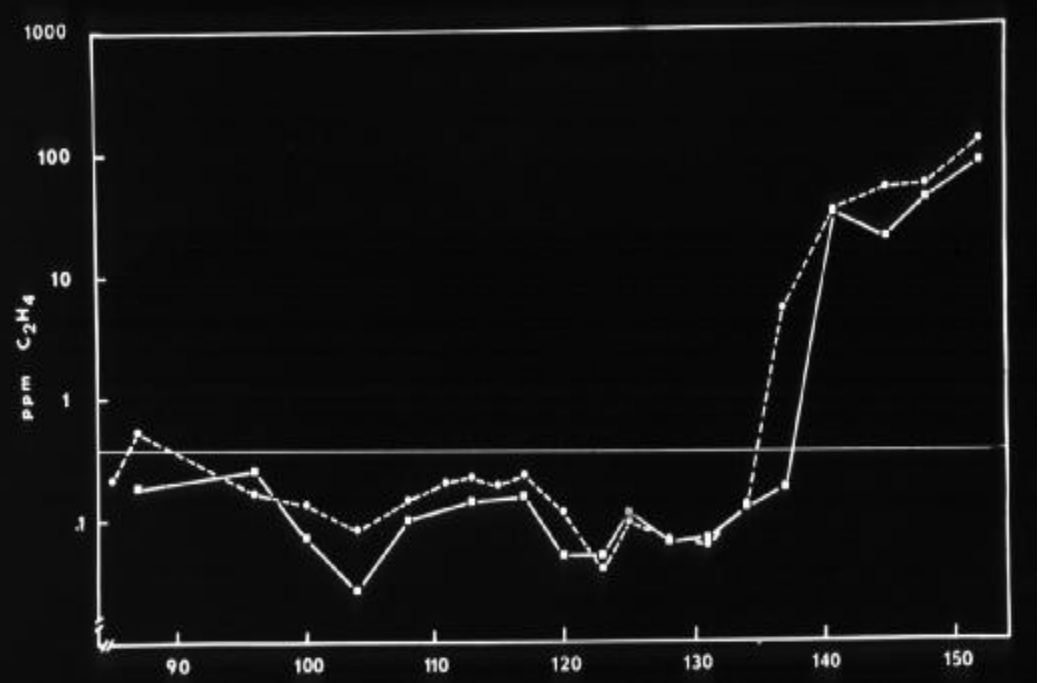
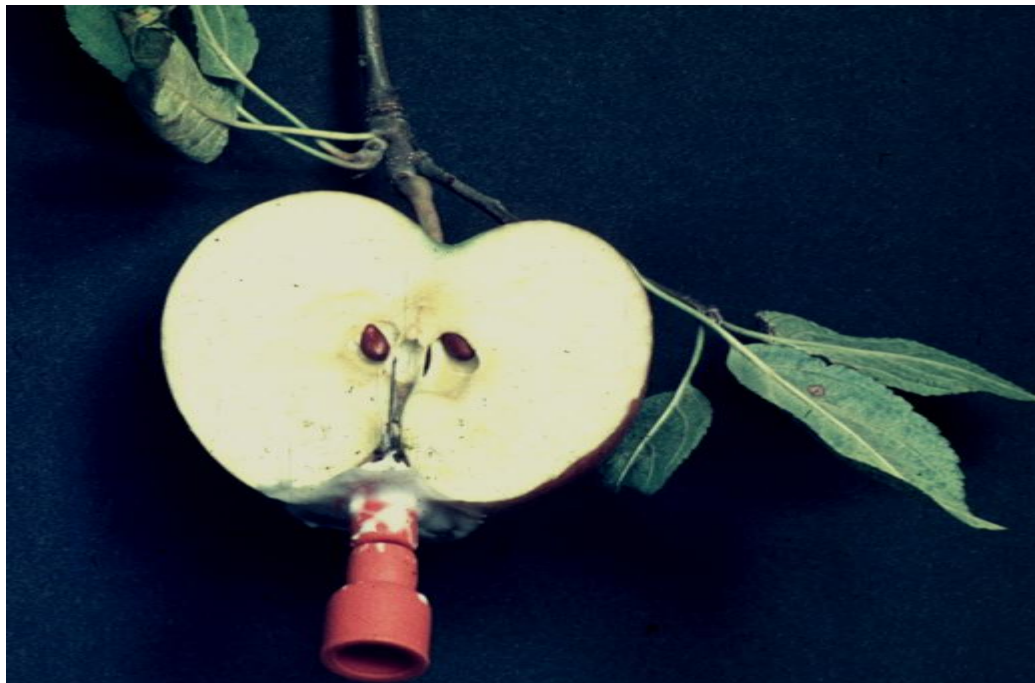
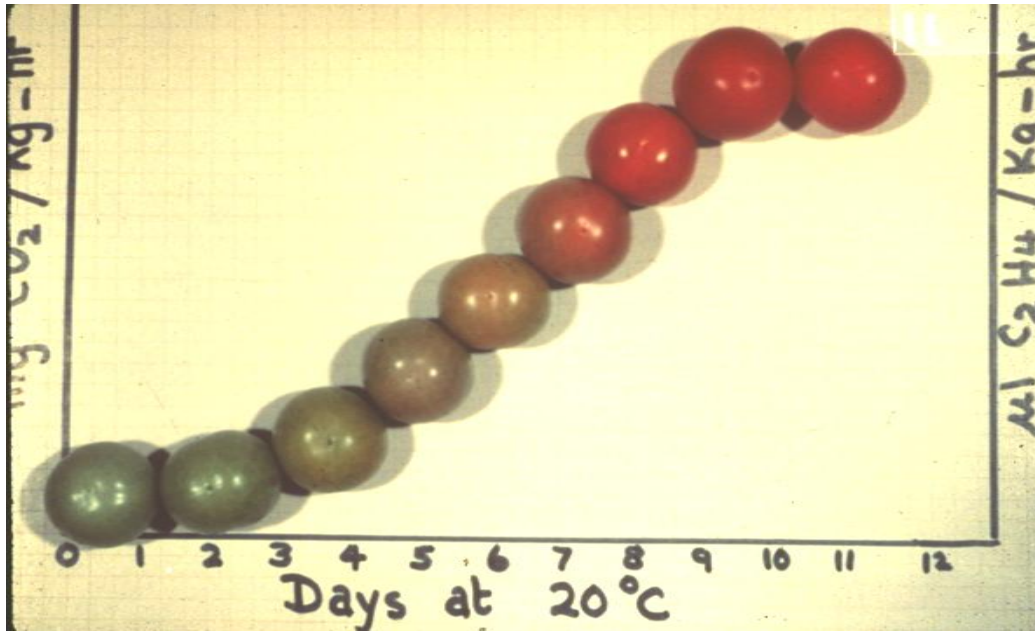
Hook swelling and curvature



Epinasty



Ethylene production



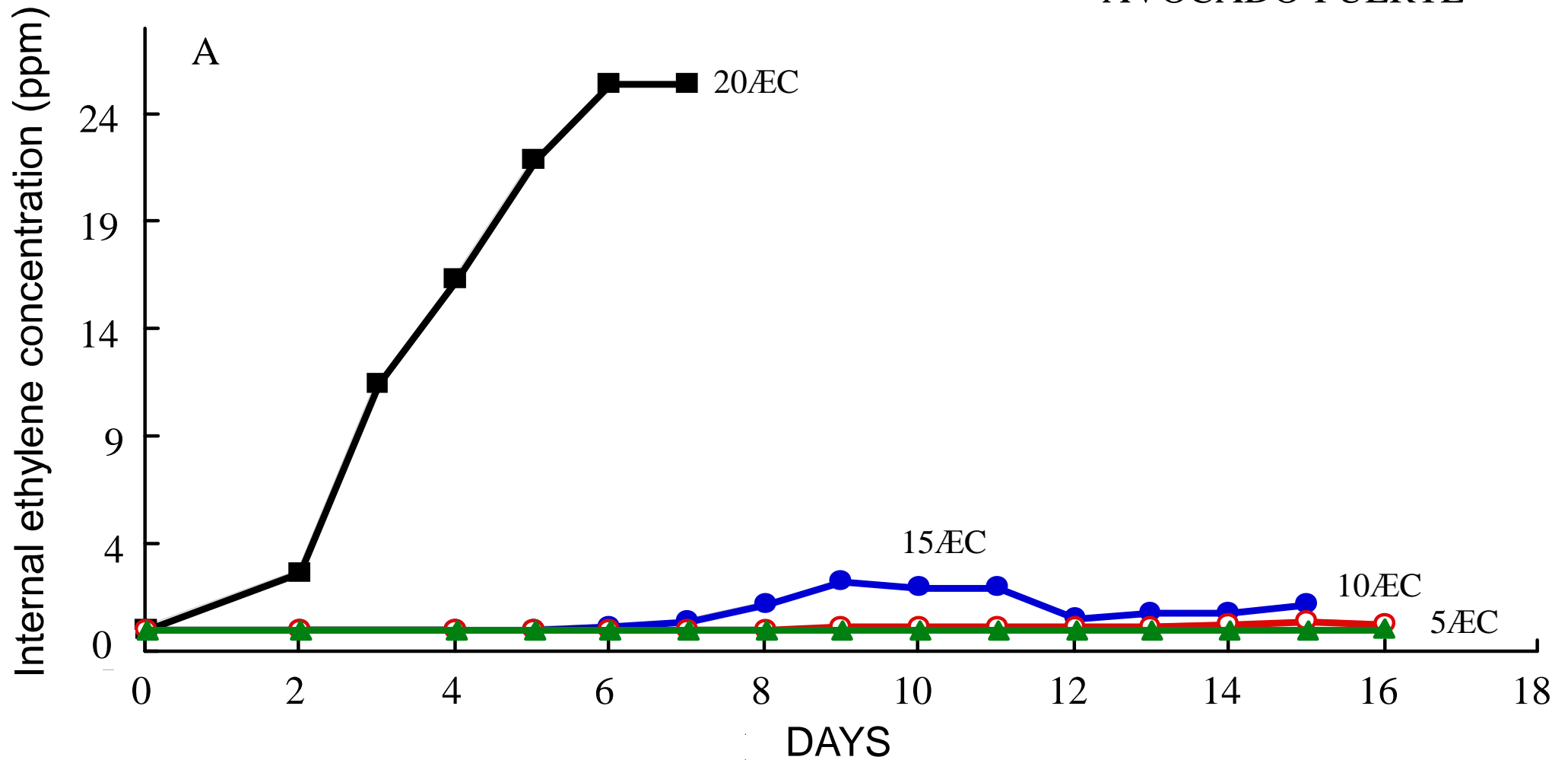
Factors affecting ethylene production

Temperature



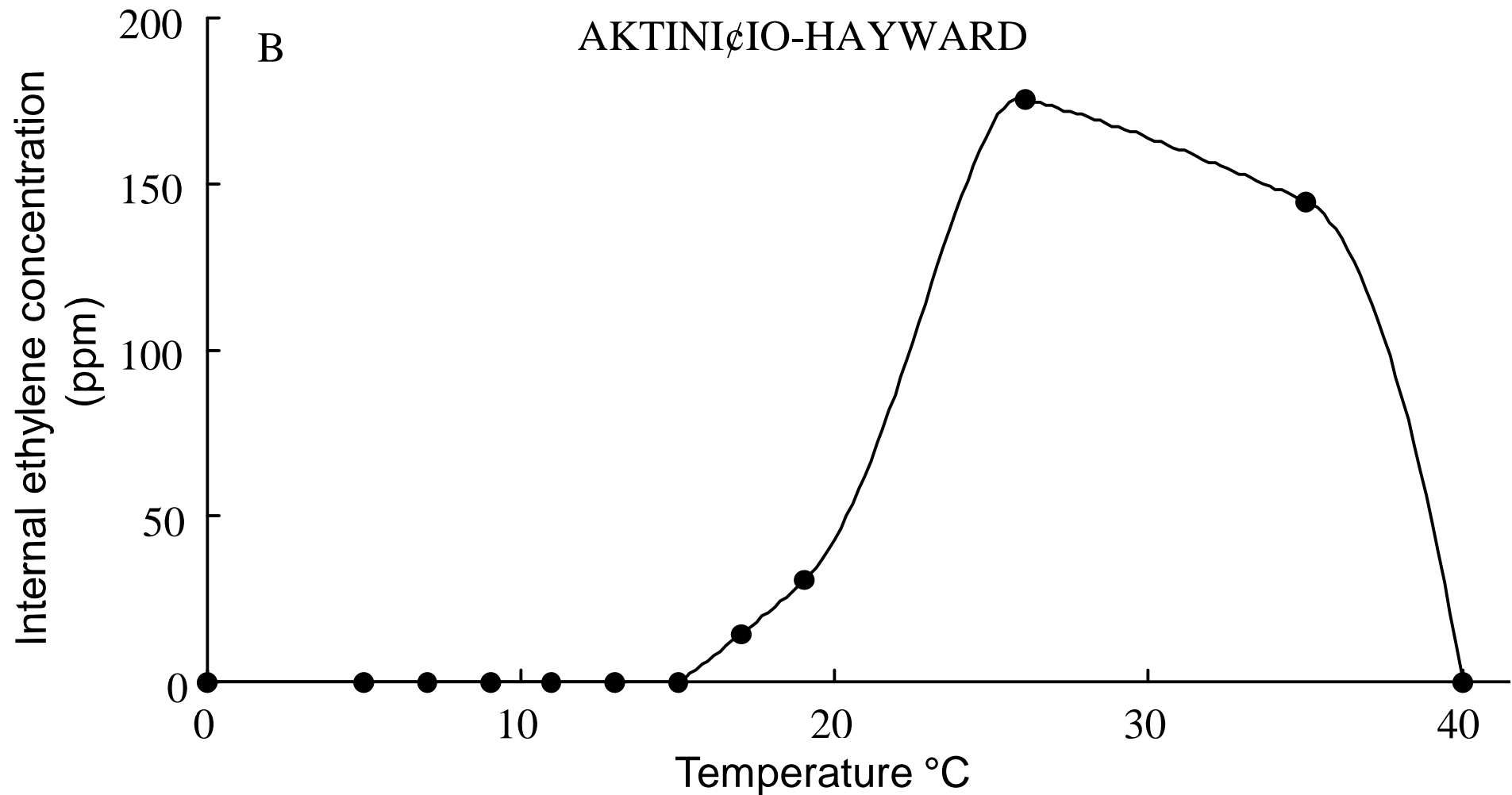
AVOCADO-FUERTE

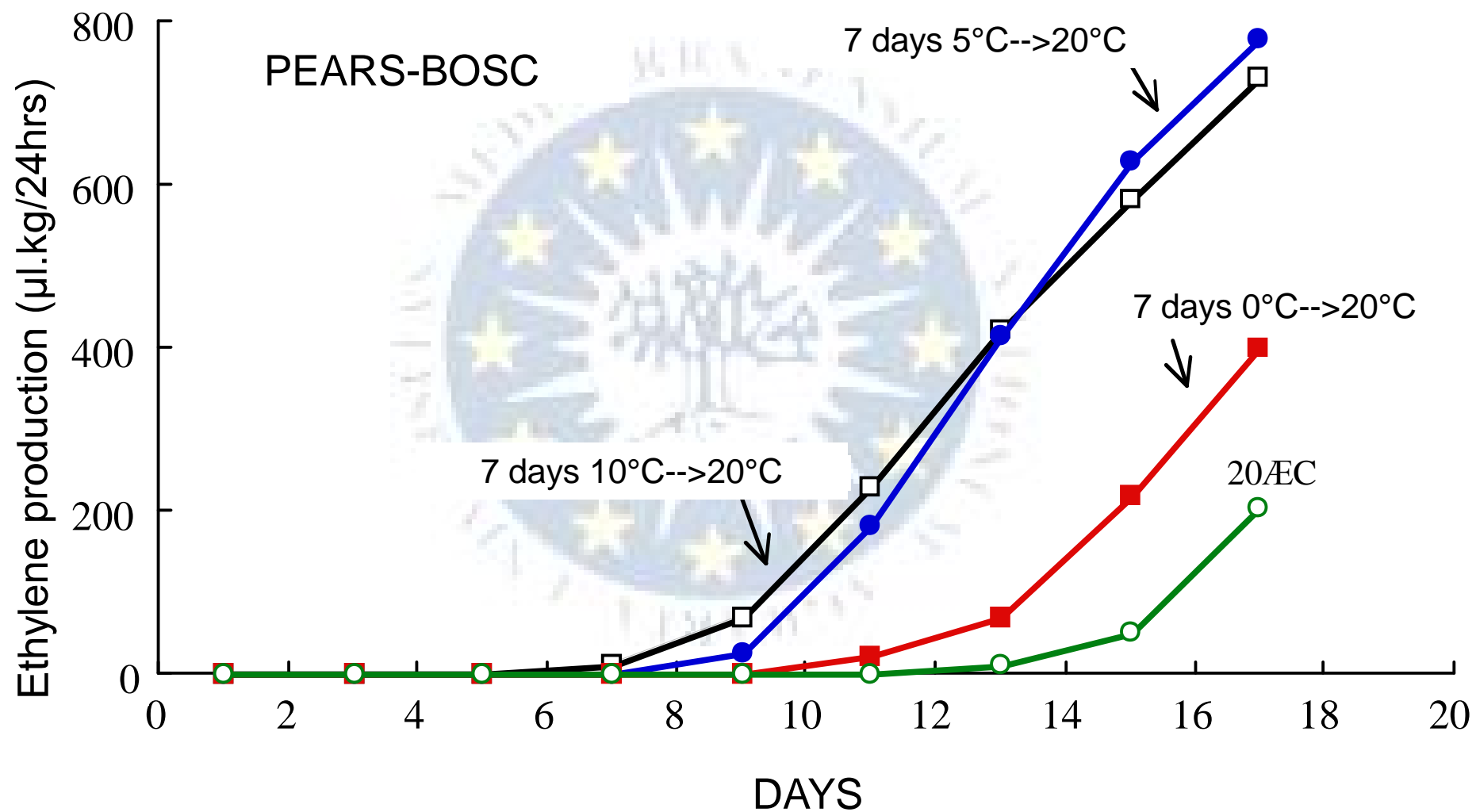
AVOCADO-FUERTE



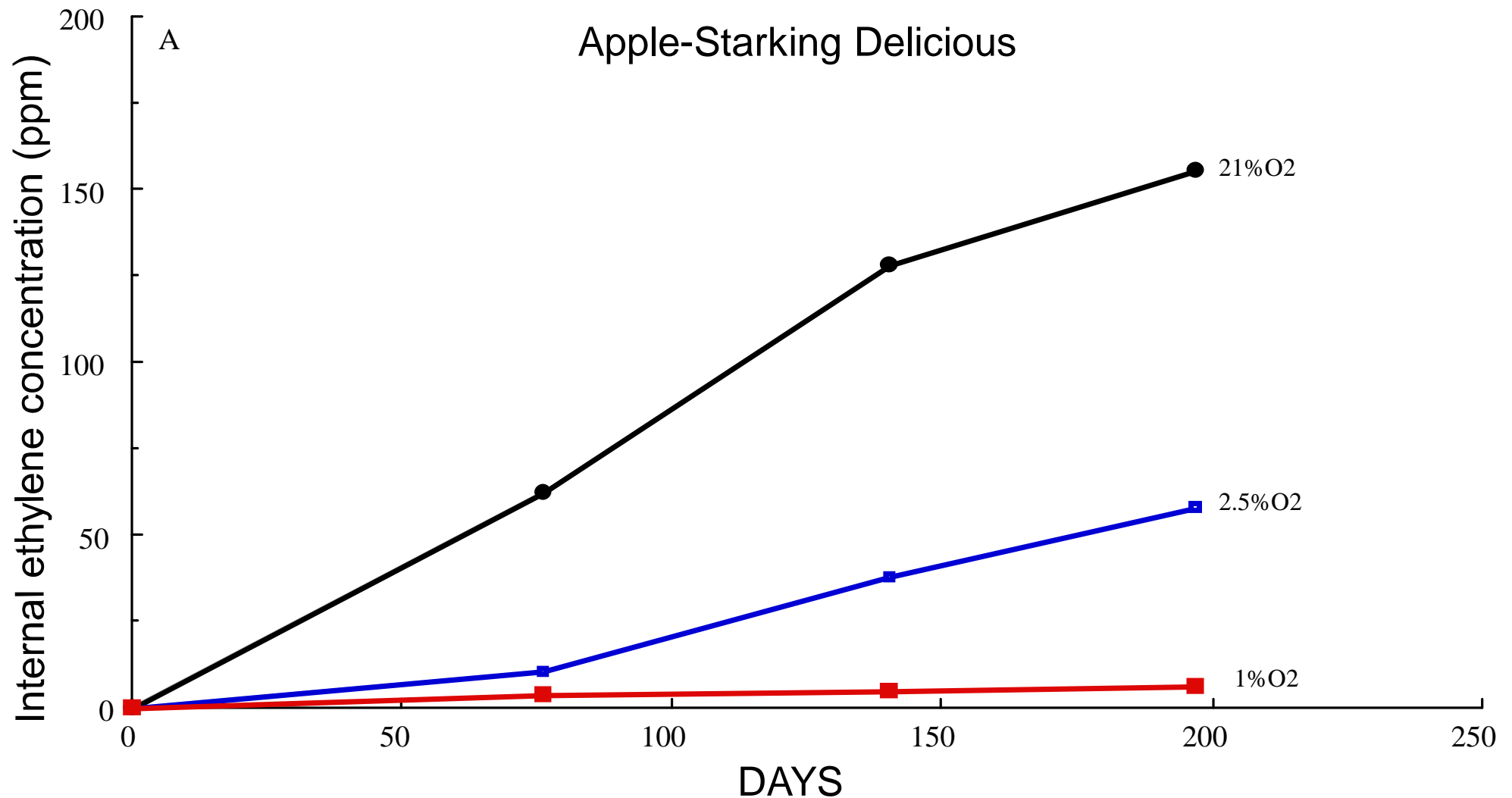
Factors influencing ethylene production

Temperature



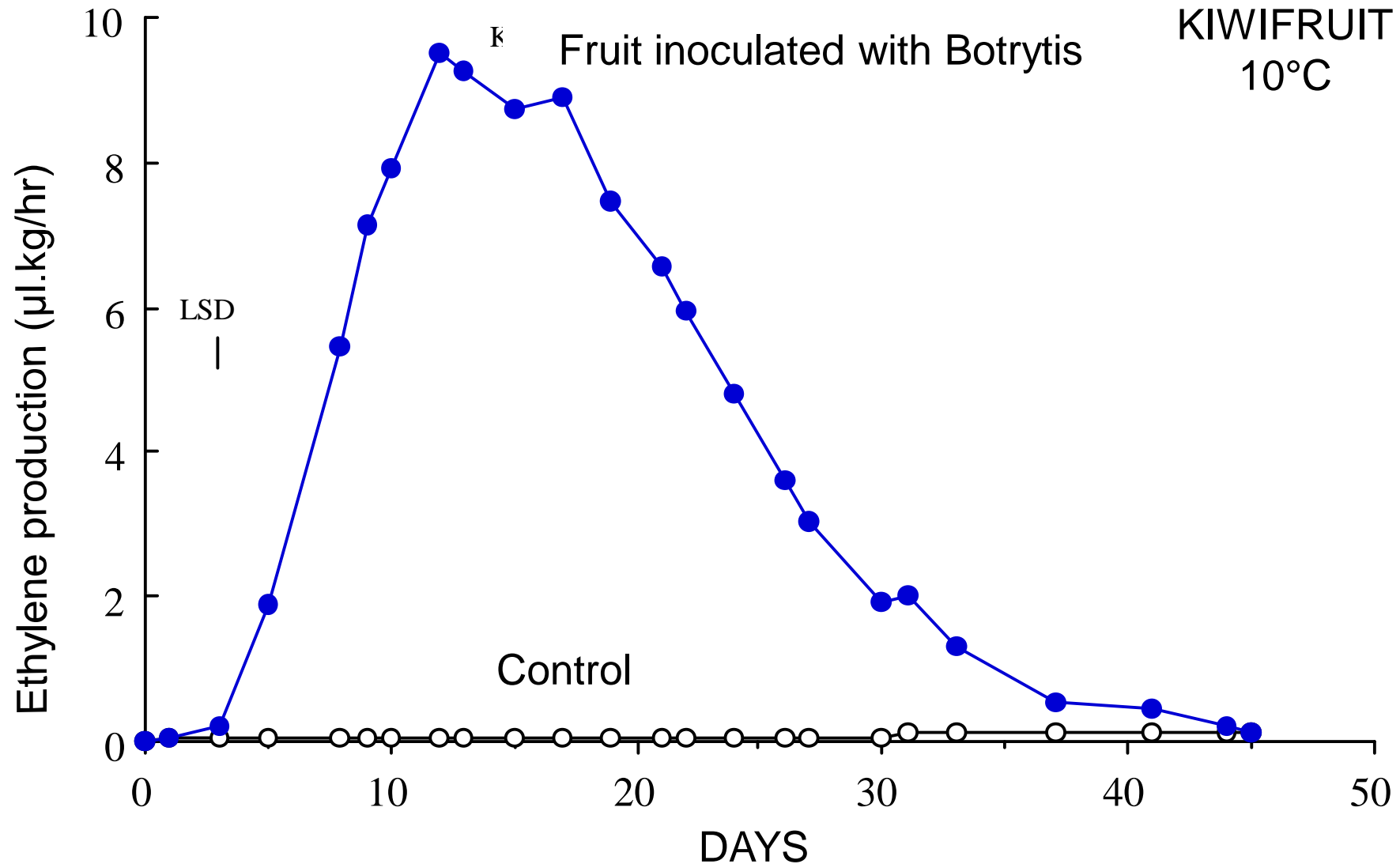


Factors influencing ethylene production [Oxygen]



Factors influencing ethylene production

Postharvest diseases



Biosynthesis of Ethylene



Methionine

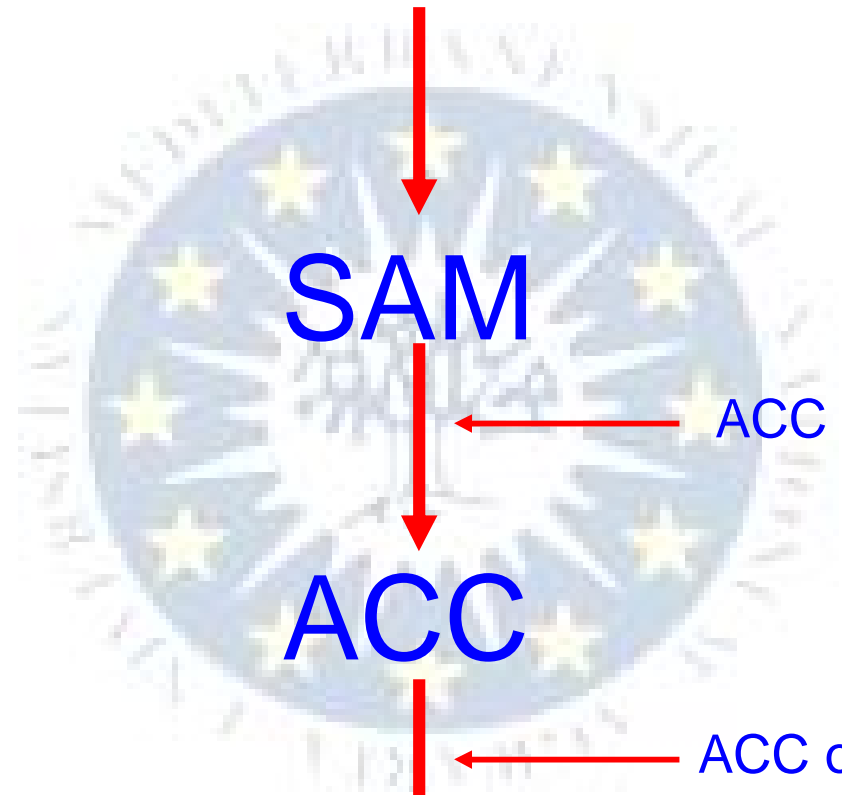
SAM

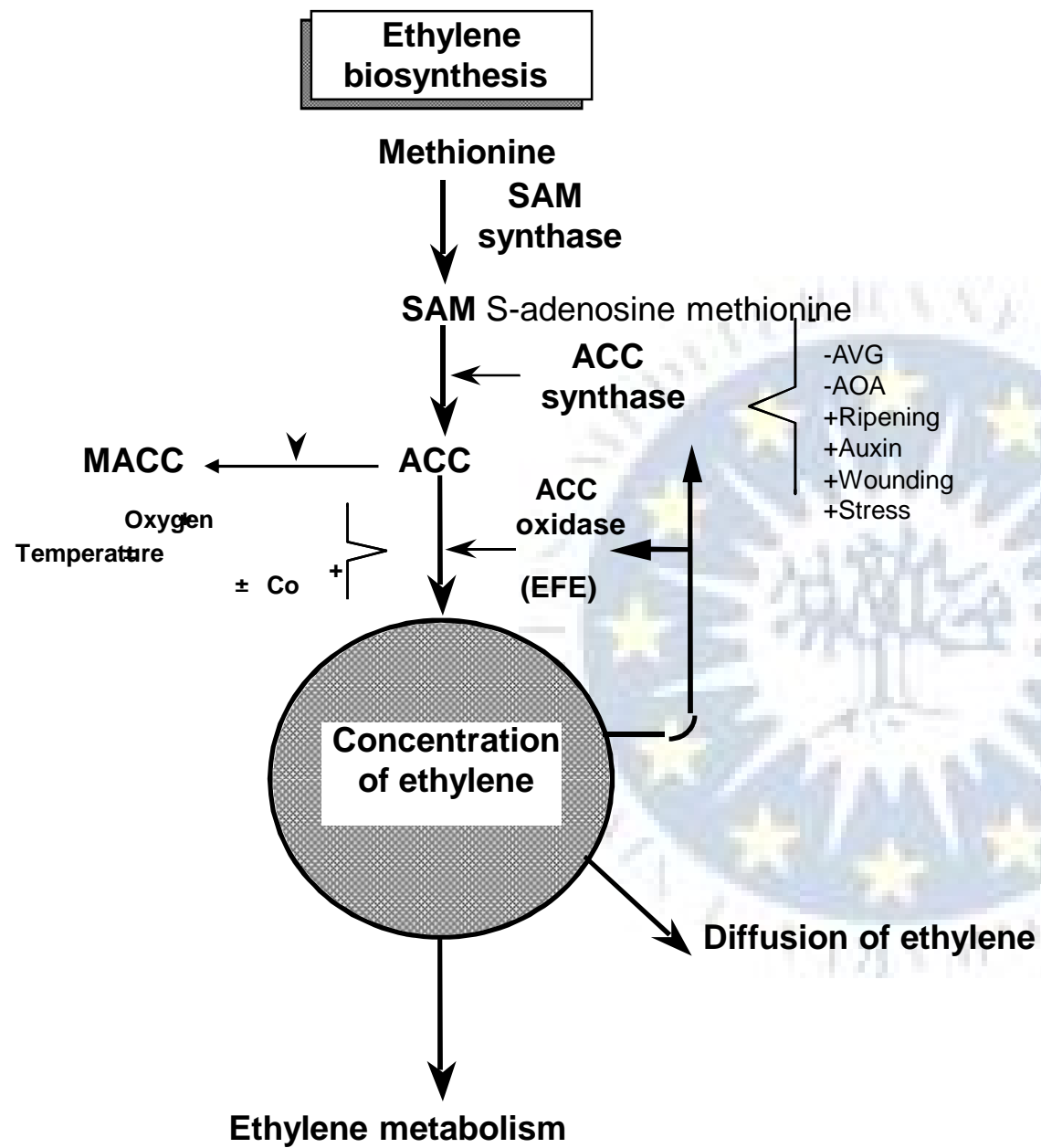
ACC synthase

ACC

ACC oxydase (EFE)

C_2H_4



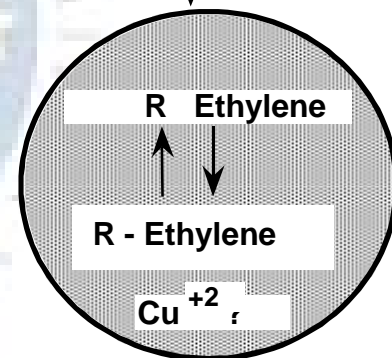




Ethylene action

Synthesis or activation of ethylene receptor

+ethylene
- Auxin
GAs
- Ripening inhibitor

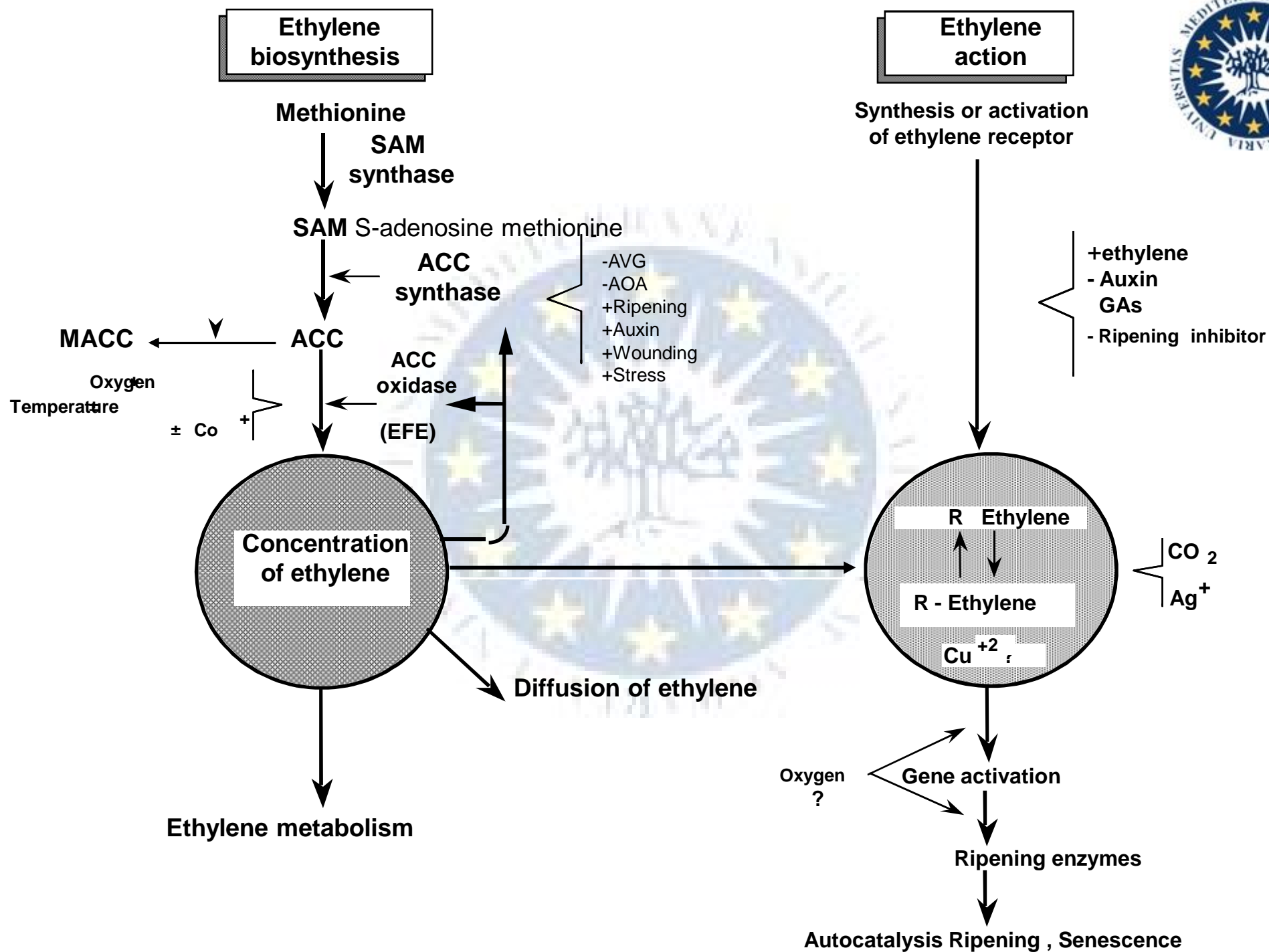


Oxygen
?

Gene activation

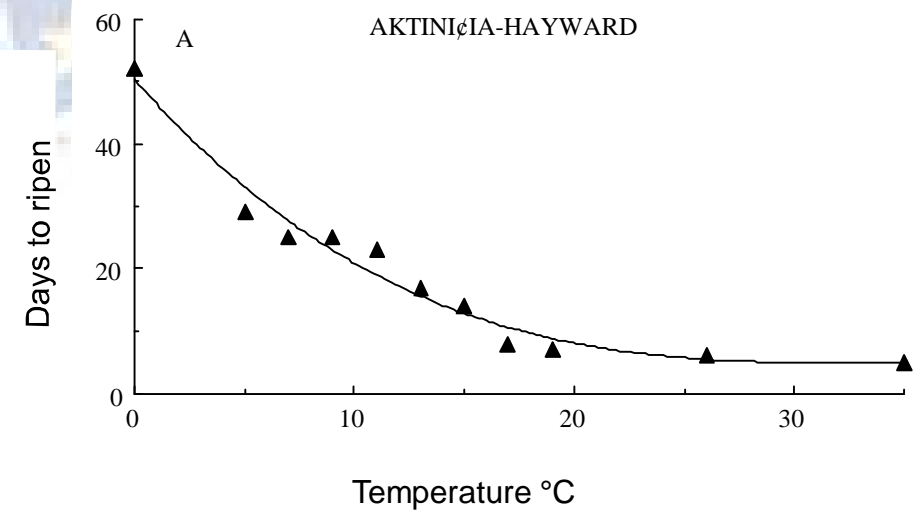
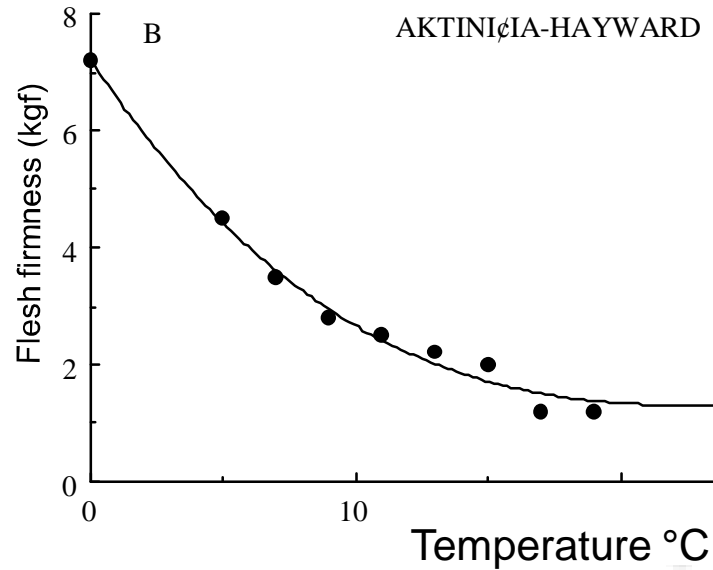
Ripening enzymes

Autocatalysis Ripening , Senescence



Ethylene action

- Temperature



Ethylene action

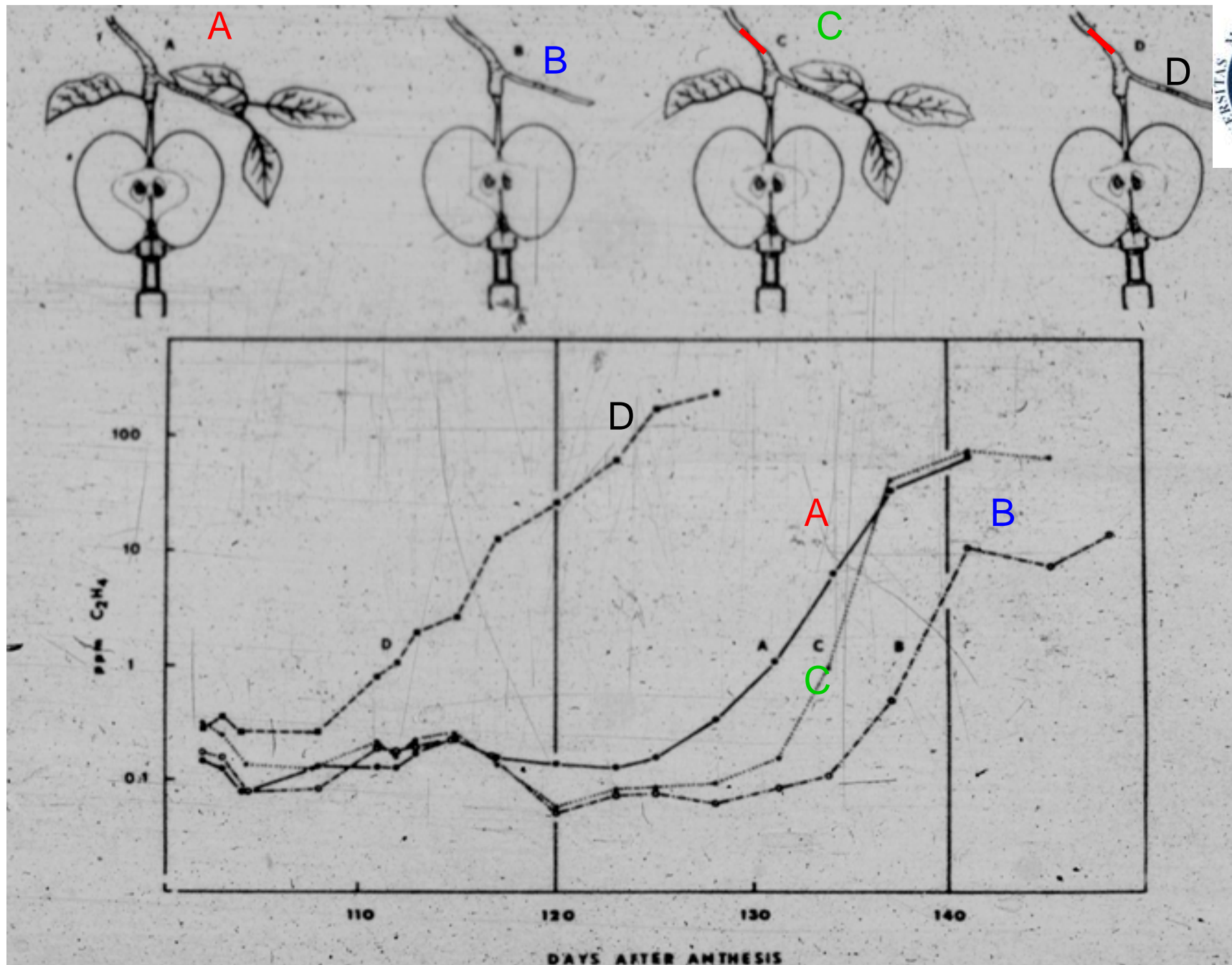
- Oxygen
- Carbon dioxide and Ag^+
- Sensitivity of the tissue





Natural inhibitor of
ethylene action





Inhibitor of ethylene production

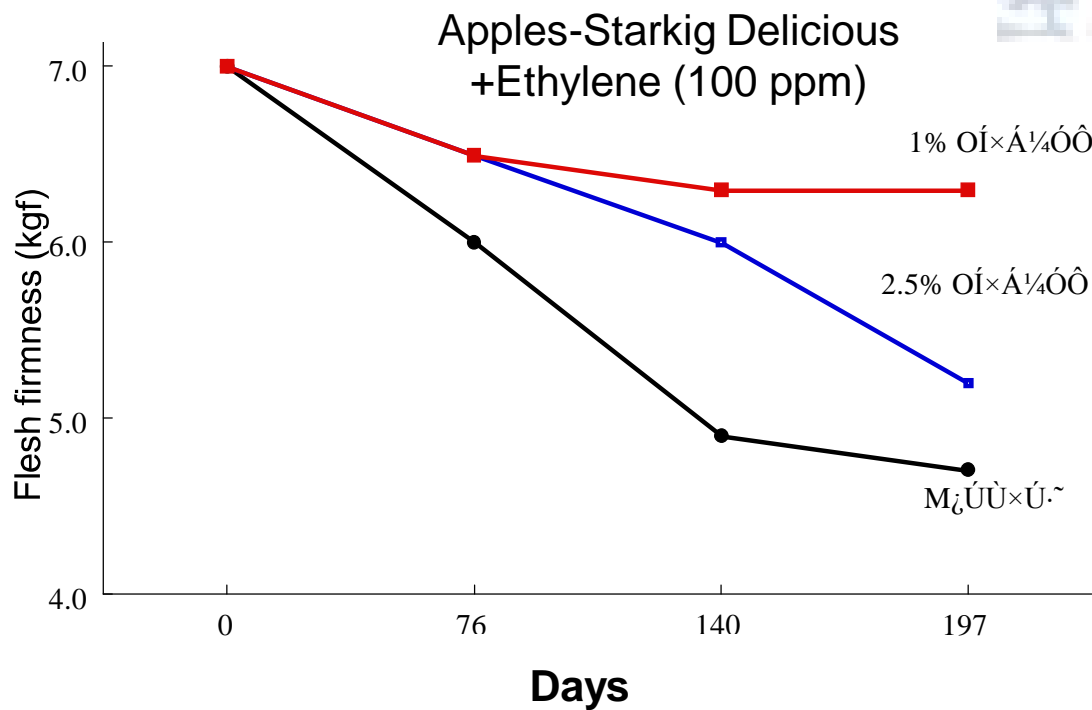
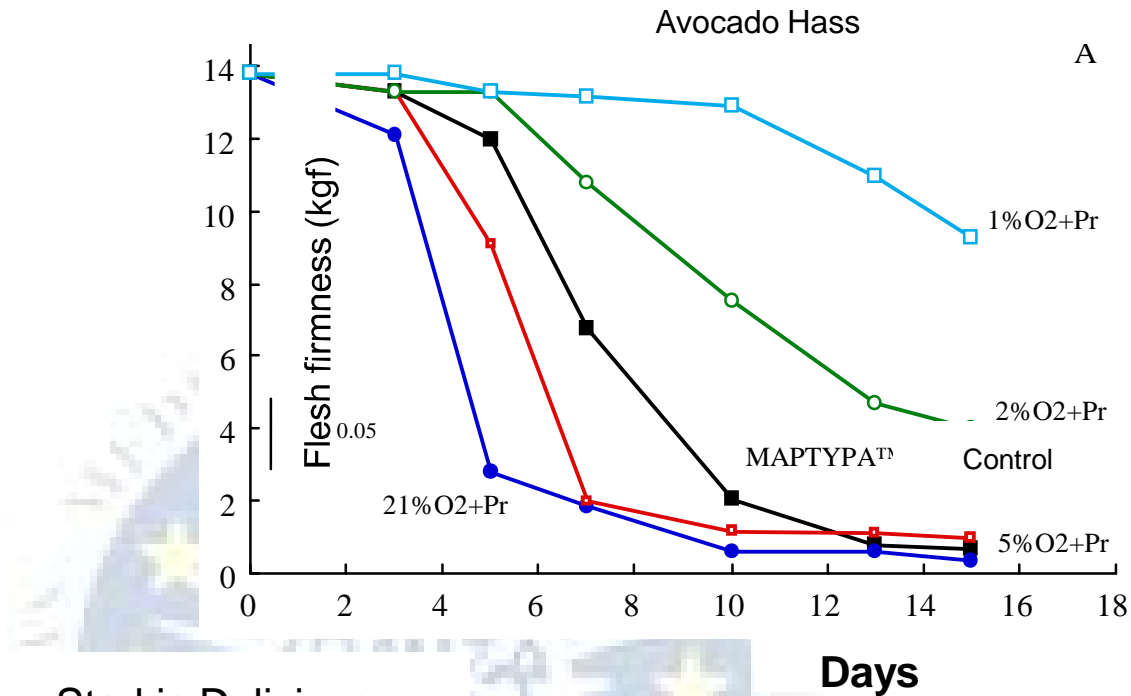
Ethylene action

- Gabon dioxide and Ag^+



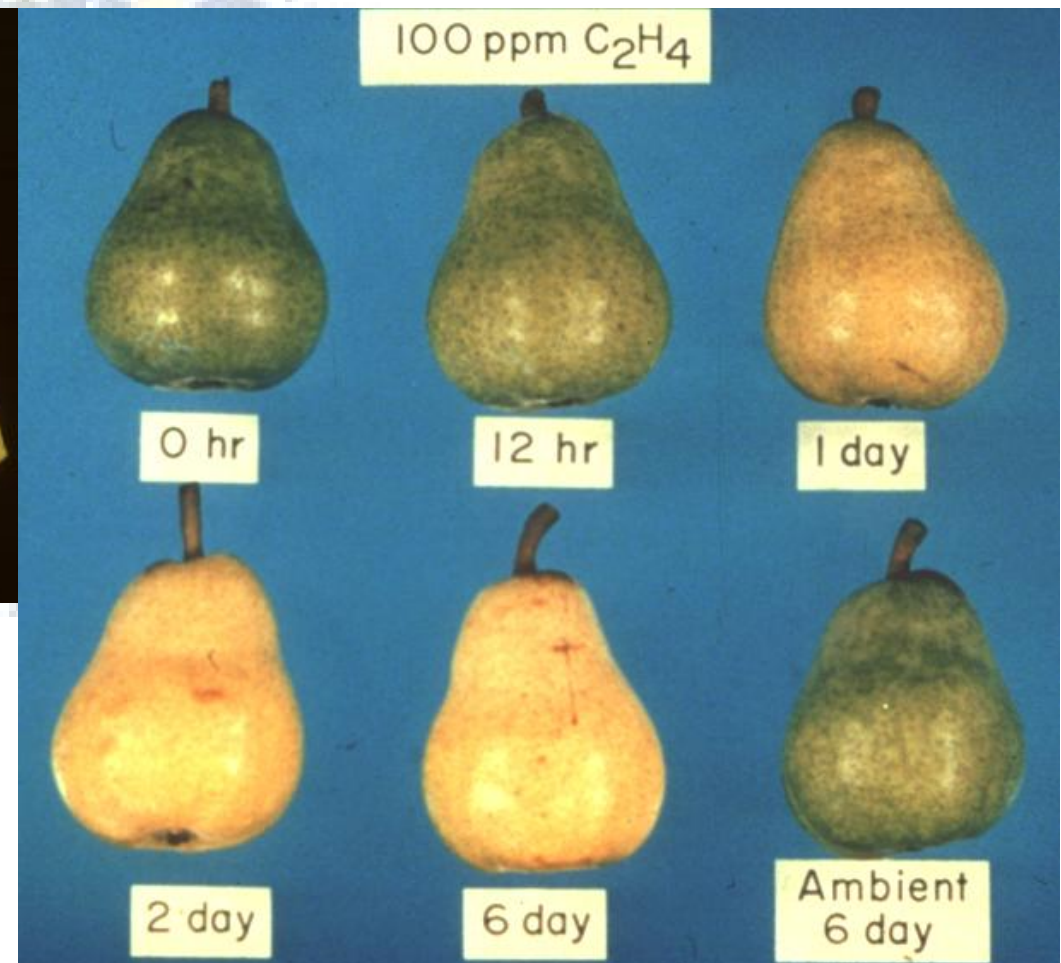
Ethylene action

- Oxygen



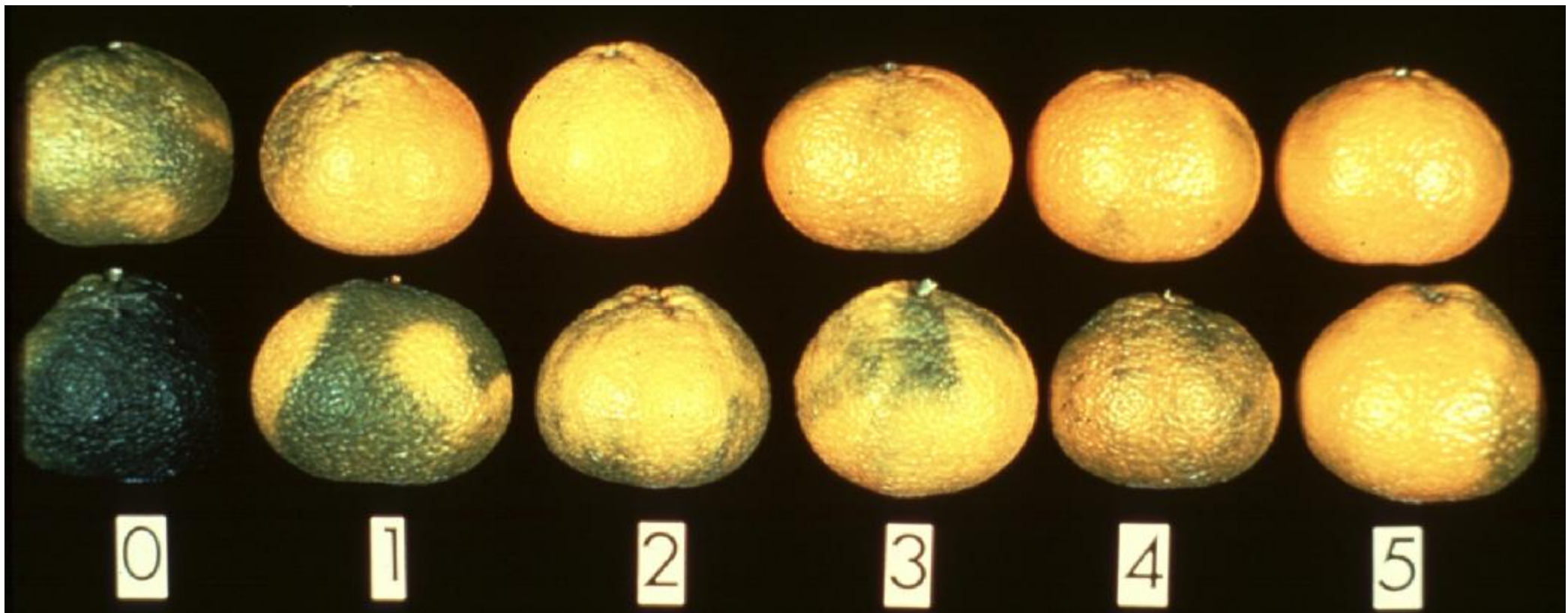
Desirable effects of ethylene

- Promote faster, more uniform fruit ripening



Desirable effects of ethylene

- Degreening citrus



Control of ethylene action

Desirable effects of ethylene



Detrimental effects of ethylene

- Accelerated senescence and ripening
- Induction of leaf disorders
- Abscission of leaves, florets and fruits
- Toughening of asparagus
- Induction of physiological disorders
- Isocoumaring formation
- Enhancement of PH diseases

Detrimental effects of ethylene

- Yellowing accelerated softening in cucumber
- Flower yellowing and opening in broccoli



Detrimental effects of ethylene

- Yellowing accelerated senescence
- Loss of green color



Detrimental effects of ethylene

- Leaf abscission



Ethylene action

Detrimental effects of ethylene

- Sleepiness of carnations
- Petal abscission





Detrimental effects of ethylene

- Enhancement of PH diseases





Postharvest use of ethylene in artificial fruit ripening

C_2H_4

Ethephon

Ethylene gas

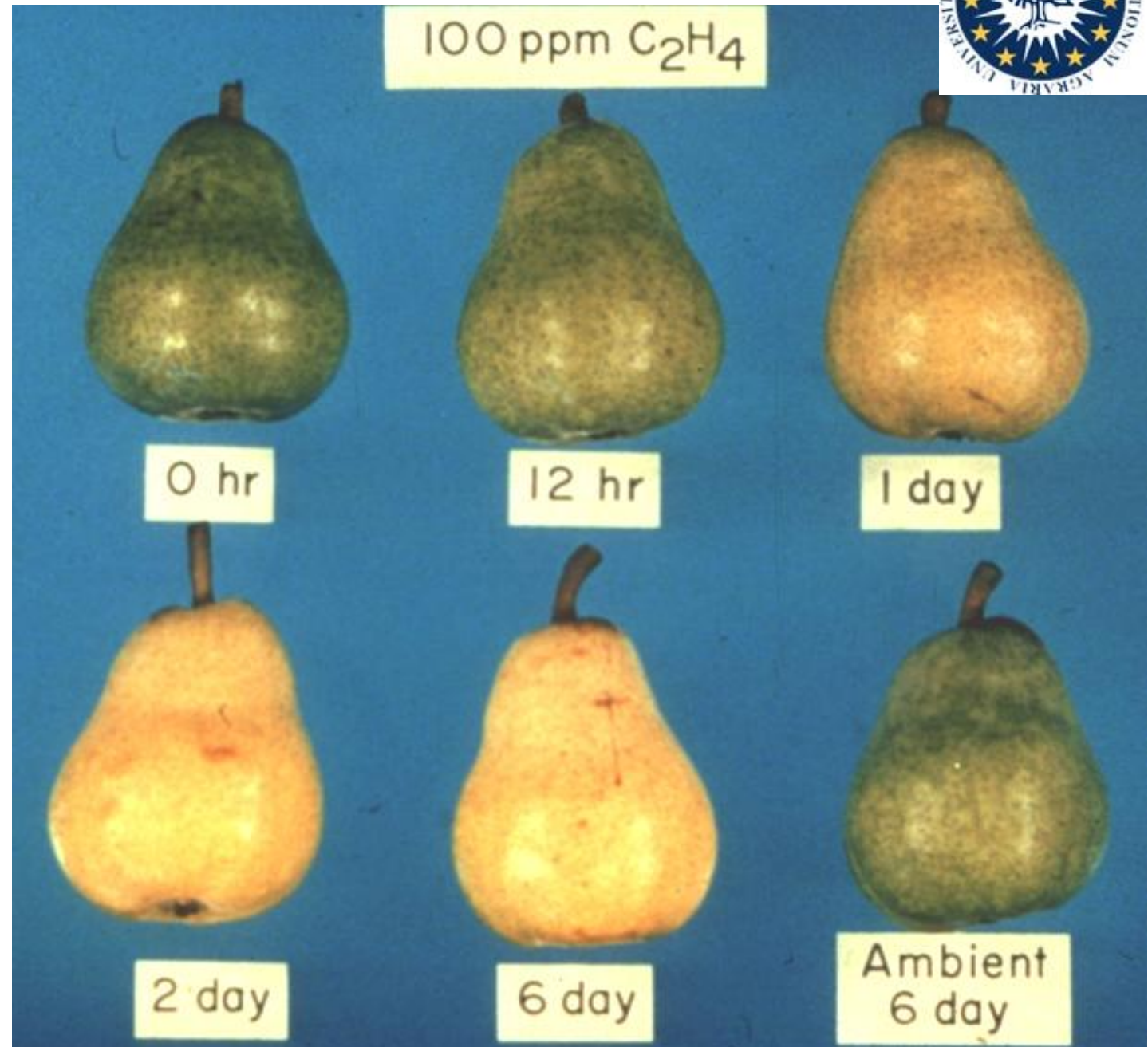
Ripening fruits



Promote faster, more uniform fruit ripening



Promote faster, more uniform fruit ripening

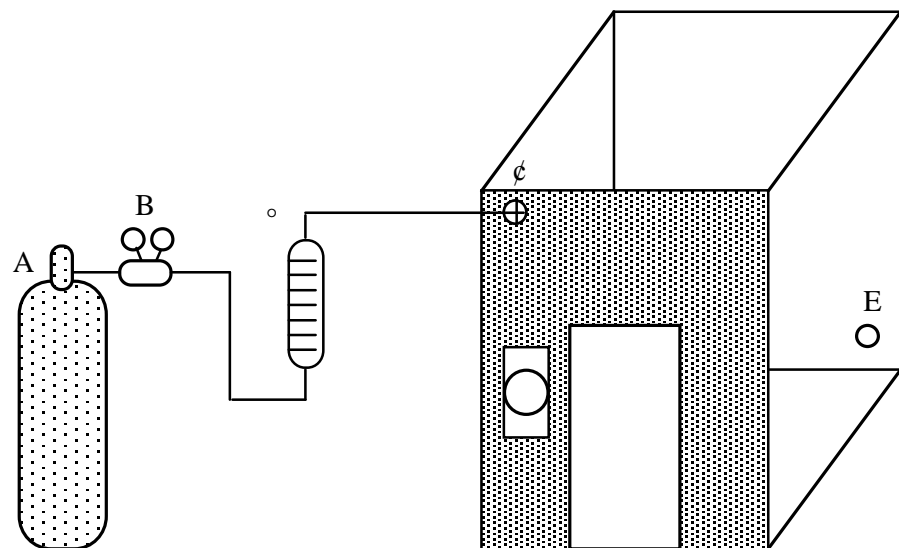


Use of ethylene in fruit ripening

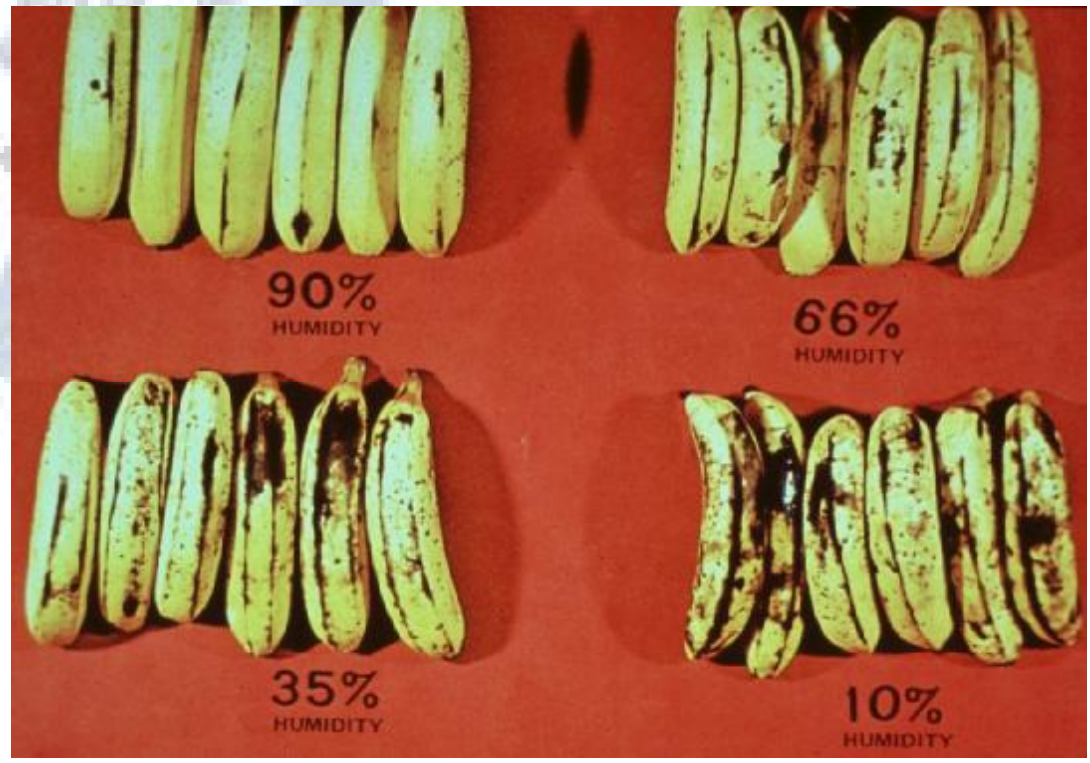
$\text{CaC}_2 \rightarrow \text{acetylene}$



ξΑ§ΑΜΟ™ ΤΕΧΝΗΤΗ™ øPIMAN™Η™ °ΡΟΥΤøN



A = K‡İËÓ%oÚÔ~ İ·Áİ·ÙÔ~ ·ÈÐ×İÂÓ·Ô×
 B = P×ĐİÈÛÙ~ ¾>ÂÛË~
 ° = P×ĐİÈÛÙ~ ÚÔ~
 φ = E>ÛÔ%oÔ~ ·ÂÛ>Ô×+ ·ÓÂİÈÛÙ·Ù~
 E = 'ΑÓÔÈÁİ· ÁË· Áİ·ÂÚÈÛİ¼

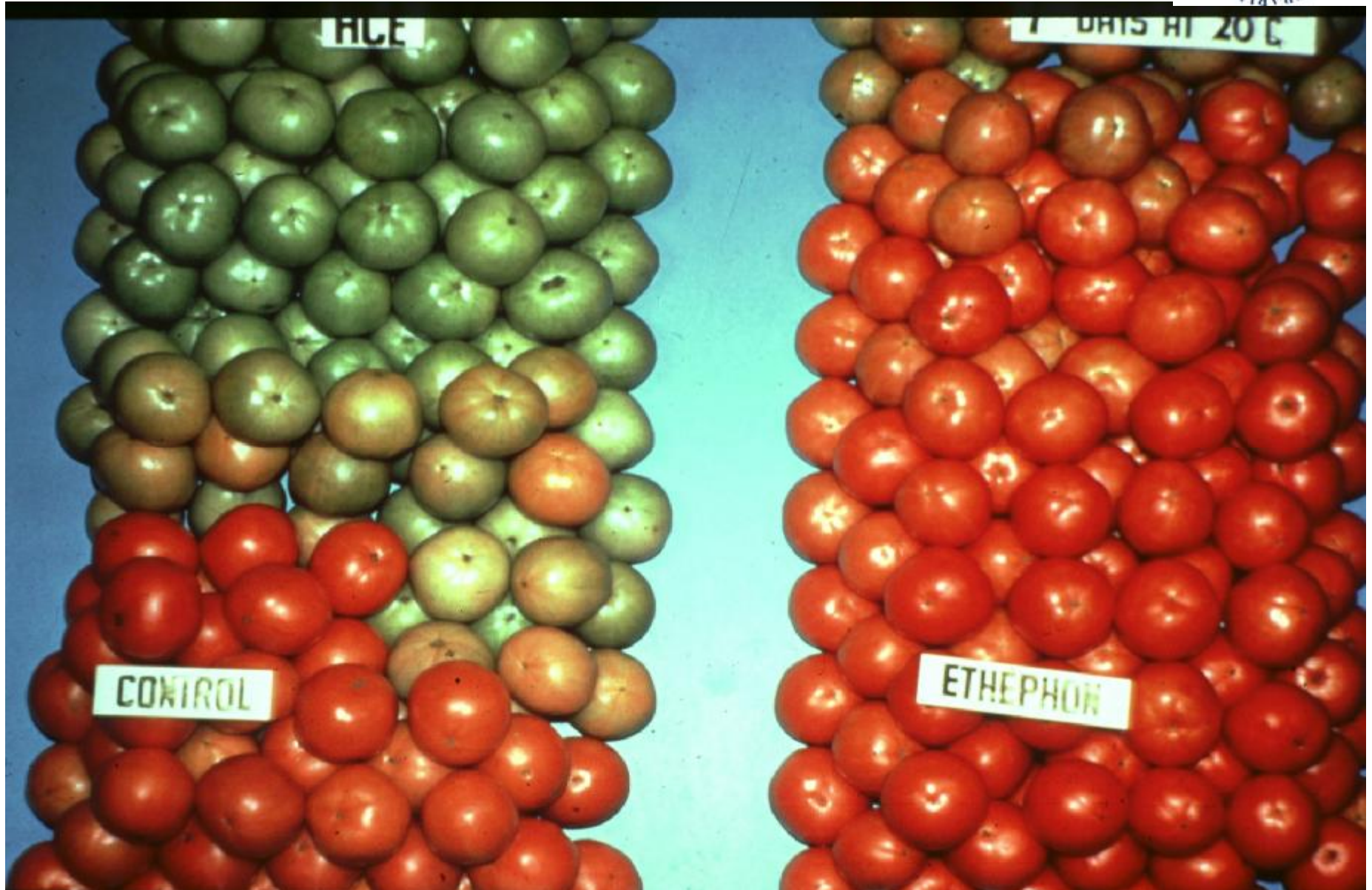


Ethylene generator



Postharvest use of ethylene in fruit ripening

Ethephon



Avoiding exposure to ethylene



Sources of ethylene

- Internal combustion engines.
- Fungi and virus-infected plants
- Decomposing produce
- Florescent ballasts
- Ripening fruits

Overcoming undesirable ethylene effects

Ventilation

Ethylene scrubbers



Overcoming undesirable ethylene effects



Ethylene scrubbers

Activated charcoal

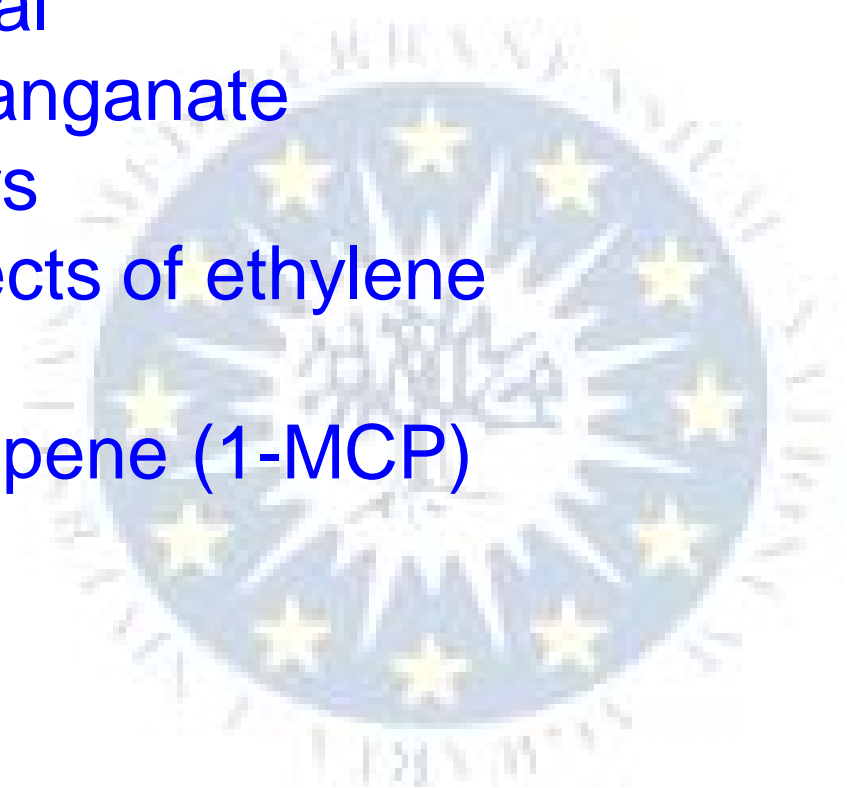
Potassium permanganate

Catalytic oxidisers

Inhibiting the effects of ethylene

Bacterial system

1-methylcyclopropene (1-MCP)



Η ΠΡΟΦΥΛΑΞΗ ΜΕ **Ethysorb**
ΓΙΝΕΤΑΙ ΜΕ ΑΥΤΕΣ ΤΙΣ ΕΥΚΟΛΑ
ΧΡΗΣΙΜΟΠΟΙΗΣΙΜΕΣ
ΜΟΡΦΕΣ

Ethysorb Φακελλάκια 5 GM.

Προσφέρουν μεμονωμένη
προστασία σε κιβώτια με
προϊόντα όπου είναι αδύνατο
να εξασφαλιστεί ένα ολόκληρο
απαλλαγμένο από αιθυλένιο
περιβάλλον (εμφανιζόμενο
στο πραγματικό τους μέγεθος).



Ευσκευασία 7KG Ethysorb σε φίλτρο-στρώματα με τρεις οπές

Χρησιμοποιούνται σε ισόγειες
αποθήκες για την εξασφάλιση
ενός απαλλαγμένου
αιθυλενίου περιβάλλοντος.



Σωλήνες 1 KG.

Χρησιμοποιούνται σε αποθήκες
πλοίων και σε μεταφορικά
μέσα όπου η κίνηση δυνατό να
απαιτεί μια πιο ισχυρή μορφή
προστασίας.



Πόση προστασία Ethysorb χρειάζεται;

Ένας απλός και πρακτικός τύπος καθορισμού απαιτούμενης
ποσότητας ETHYSORB είναι ο εξής:

Για φακελλάκια:
Κιλά προϊόντος σε κουτί x ημέρες αποθήκευσης ή μεταφοράς
x 0.10 GM ETHYSORB.
π.χ. Κιβώτιο 20 KG προϊόντος x 10 ημέρες φύλαξης x 10GM
ETHYSORB απαιτεί 4 φακελλάκια ETHYSORB των 5 GM.

Το παραπάνω σχήμα δυνατό να πολλαπλασιάζεται με τον
αριθμό των κιβωτίων για φύλαξη ή μεταφορά.

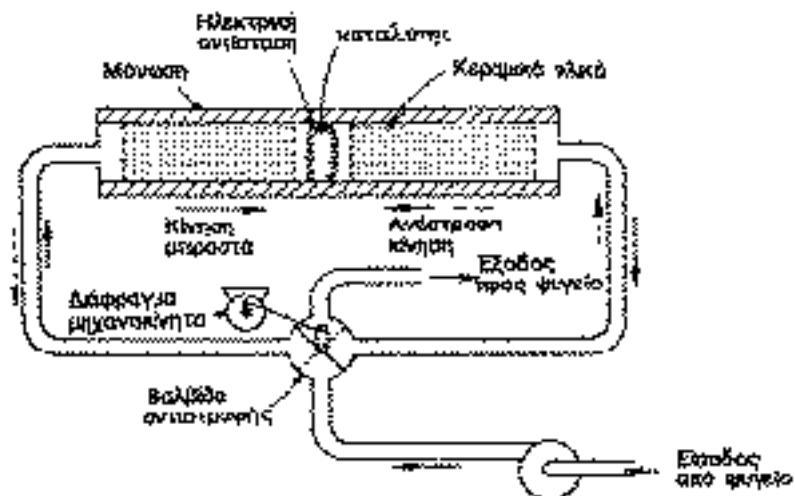
Για αποθήκευση μεγάλων ποσοτήτων προϊόντων δυνατόν να
εφαρμόζεται ο παραπάνω τύπος είτε πρόκειται για
προστασία με ETHYSORB σε σωλήνες ή στρώματα.

Potassium permanganate scrubbers





Catalytic oxidizers



Overcoming undesirable ethylene effects



Chemical control

- Alar
- AVG
- 1-MCP



Overcoming undesirable ethylene effects

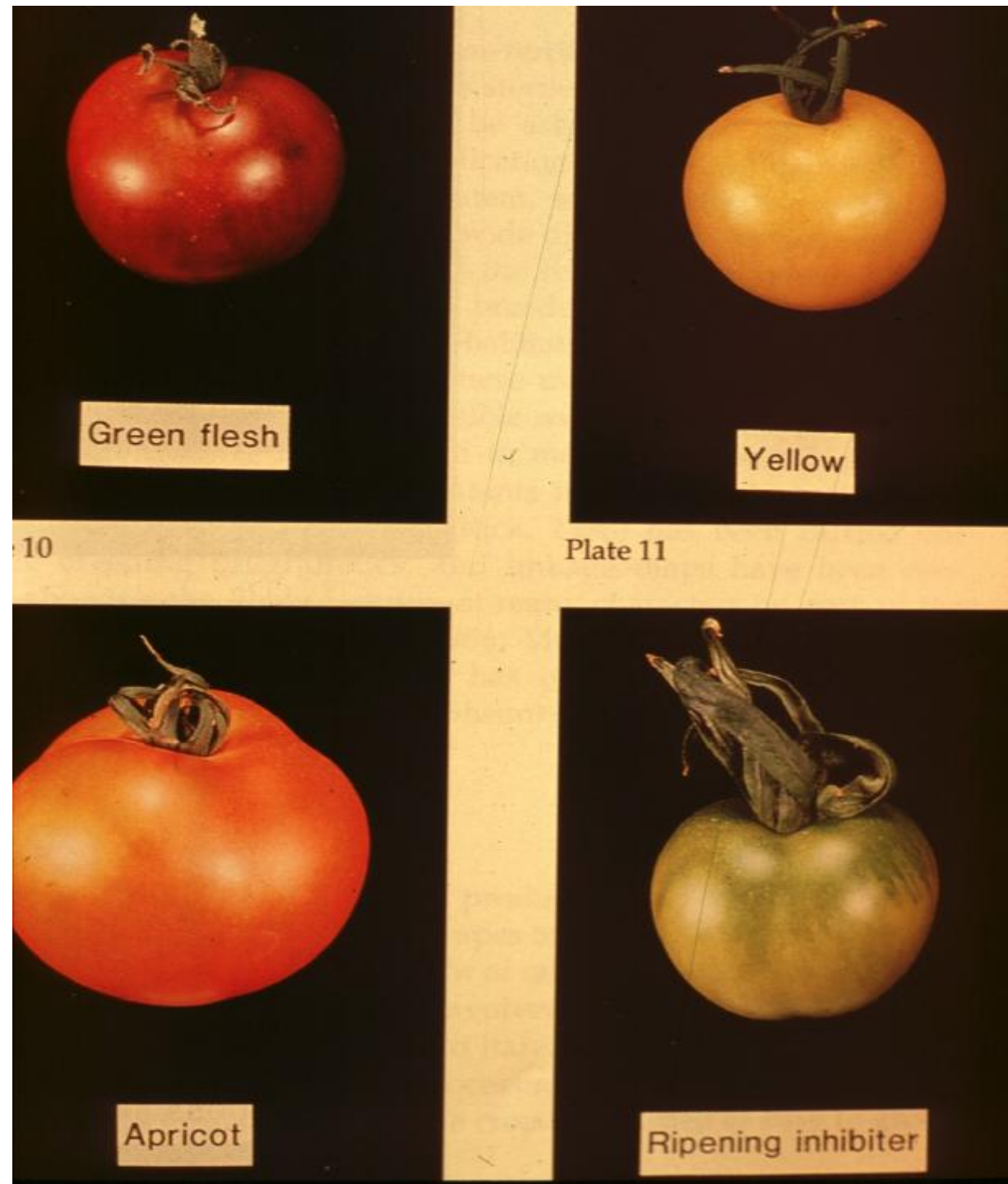


- 1-MCP

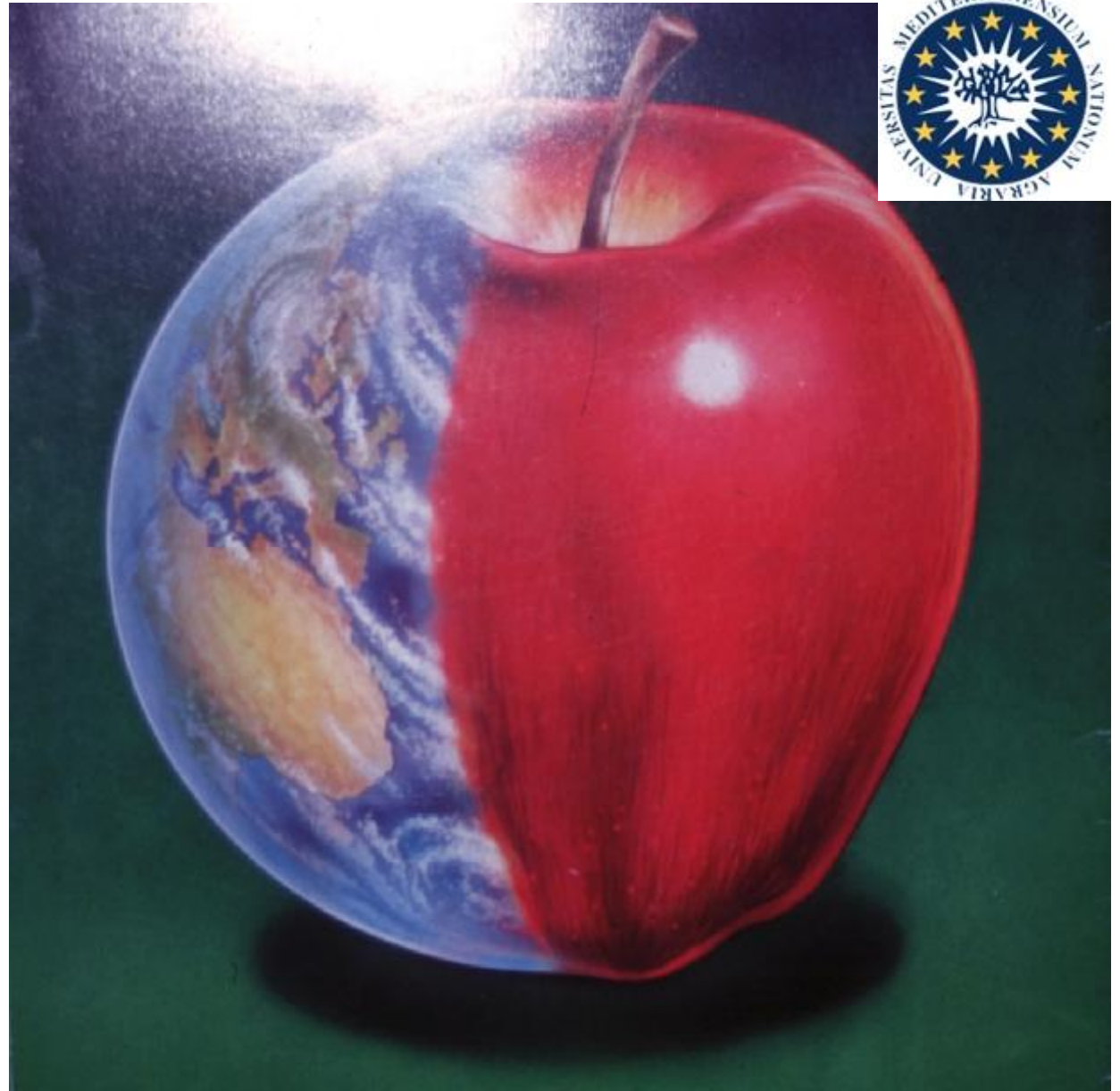
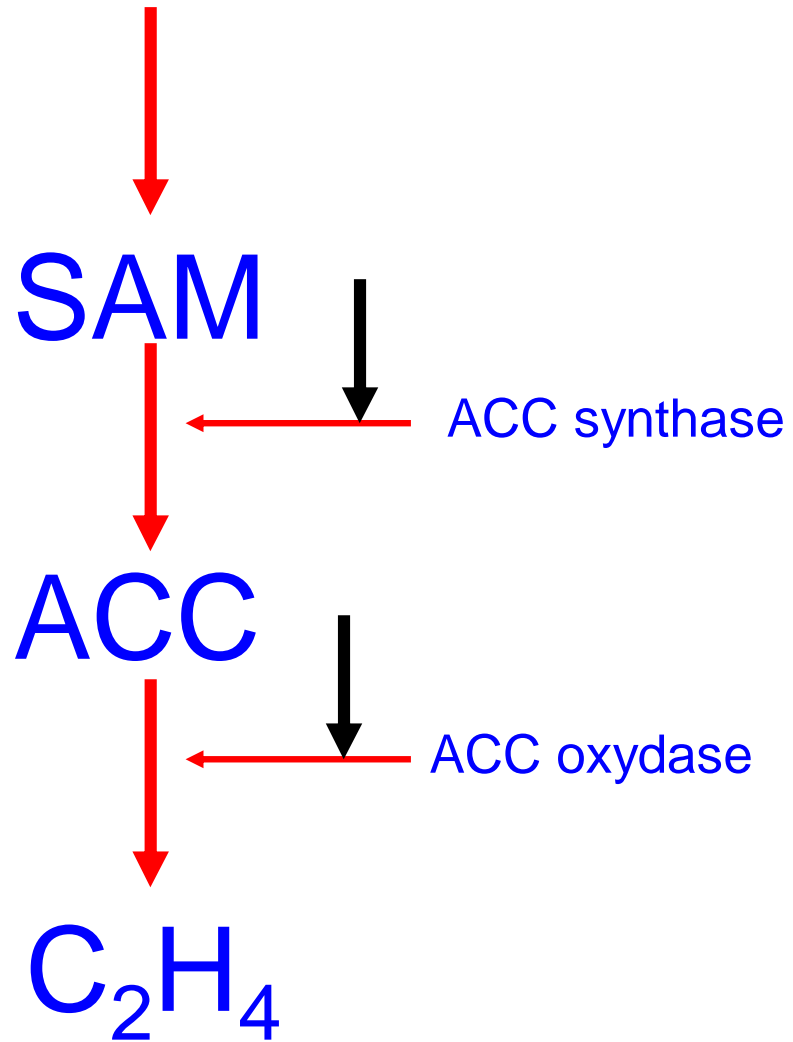
1-MCP blocks the ethylene receptors and inhibits its hormonal action

Effective tool for commercial application in order to maintain quality and extend the shelf-life of fruits and vegetables

Biotechnology



Biotechnology





Assignment for each student:

a specific topic will be requested from each student for home work

Proposed topics for home work

Propose methods to overcome the detrimental effects of ethylene in postharvest life of fruits and vegetables

Control of dormancy by agrochemical in postharvest life of potato tubers and possible alternative treatments to replace chemical treatments

The role of 1-MCP to preserve quality and prolong the storage life of leafy vegetables